Sveučilište u Zagrebu Agronomski fakultet
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Post harvest technology (296560)

Nositelj kolegija

prof. dr. sc. Ana Matin

Opis kolegija

Post harvest technology module includes agrarian products finishing and storing technologies from material reception to its dispatch. Special programme unit will include technological procedures of product preserving by drying the mercantile and seed material, drier types and process automatization. Procedures of finished products storage, physiological and chemical processes during the storing and storage and silage types will also be elaborated. One of the programme units will include fundamentals of designing in post harvest technology with activity diagram drafting for family farms and large industrial plants.

ECTS: **6.00**

E-učenje: **R1**

Sati nastave: 60
Predavanja: 42
Laboratorijske vježbe: 6
Vježbe u praktikumu: 6
Seminar: 6

Izvođač predavanja

- prof. dr. sc. Ana Matin

Izvođač vježbi

- doc. dr. sc. Ivan Brandić

Izvođač seminara

- doc. dr. sc. Ivan Brandić

Ocjenjivanje

Dovoljan (2): 60-69 %
Dobar (3): 70-79 %
Vrlo dobar (4): 80-89 %
Izvrstan (5): >90%

Vrsta kolegija

- Undergraduate studies / BS Courses taught in English (Izborni kolegij, 1. semestar, 1. godina)

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Opće kompetencije

After the lectures the students will gain knowledge about post-harvest technology which enables storage of agricultural products during the whole year in full quality, identification and elimination of negative processes which may be occur during processes and storage.

Oblici nastave

- Lectures
- Practicum
  as part of the practicum exercises in the calculation of hx diagram are carried out, physico-chemical characteristics of grain corn, ways of drying (single-phase and two-phase), the calculation of the balance of dryers, determine the amount and type of additives and the equipment and machines for their cleaning, the system of long-term and short-term storage and preparation working diagrams for family farms and making working diagrams for industrial plants. Exercises are conducted in groups of 10 students.
- Seminars
  acquisition of skills - group (3 students) independently develop and present a lecture related to agricultural raw materials and possibilities of technological procedures of processing and storage of that raw material.

Ishodi učenja i način provjere

Ishod učenja	Način provjere
To understand the properties of water, air and grain for the purpose of drying and storage	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Define the physical and chemical properties of arable and other major crops during processing and storage	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Identify the equipment and machines for drying and storage	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Calculate the balance of the dryer and its energy efficiency during drying of field crops	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Mathematical modeling of primary drying processes and understand their application in practice	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Select and apply the proper technology of various hydrothermal processing of agricultural products	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Solve problems during storage and choose the optimal technology to prevent them	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Develop and analyze the conceptual design facilities for treatment and storage of various agricultural products	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam

Način rada

Obveze nastavnika

The teacher teaches the material provided by course content, checks learned material and evaluate the acquired knowledge and acquired skills through seminars, laboratory exercises, written and oral exam.

Obveze studenta

The student is required to attend all forms of teaching, lectures, laboratory exercises, seminars work according to the Regulation of Studies at the Faculty of Agriculture.

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Polaganje ispita

Elementi praćenja	Maksimalno bodova ili udio u ocjeni	Bodovna skala ocjena	Ocjena	Broj sati izravne nastave	Ukupni broj sati rada prosječnog studenta	ECTS bodovi
Attendance (lectures and exercises)				56	54	0.5
Active participation in class	5 %				7	0.5
Seminar paper (S) (preparation + presentation)	10 %			6	20	1
Partial exam 1 (PE1)	25 %	60-70 % 71-80 % 81-90 % 91-100 %	Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		25	1
Partial exam 2 (PE2)	25 %	60-70 % 71-80 % 81-90 % 91-100 %	Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		25	1
Partial exam 3 (PE3)	25 %	60-70 % 71-80 % 81-90 % 91-100 %	Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		25	1
Oral exam (OE)	10 %	60-70 % 71-80 % 81-90 % 91-100 %	Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		25	1
Total	100 %	(S+PI1+PI2+UI/4)		60	181	6

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Elementi praćenja	Opis	Rok	Nadoknada
Active participation in class	Students are encouraged to participate in discussions, ideas presentations and problem solutions, argument opinions and attitudes. Follow the theoretical and factual knowledge, presentation and communication skills, critical thinking, teamwork and social responsibility. Follow the capability of performing laboratory exercises. The observed activity in class is recorded in the student records (+), which enables the correction of the final grade and above (++) or benefit at the the oral exam (+++).	Continuous during the lessons	
Seminar paper (S) (preparation + presentation)	Seminar paper at the beginning of the semester debiting each student individually. The written work is submitted for review at least a week before presentation. The corrected thesis must be submitted in the presentation. Presentations of seminar papers beginning in the 14th week of the semester according to the agreed schedule. Assesses the ability to find and understand literature, presentation skills, analytical skills and the ability reasoning (synthesis).	1st week 13th week 14th week	
Partial exam 1 (PE1)	It includes the first part of module program. Questions from the theoretical part are open and examine the knowledge and understanding of the facts.	4th week	
Partial exam 2 (PE2)	It includes second part of the module. Questions from the theoretical part are open and examine the knowledge and understanding of the facts.	10th week	
Partial exam 3 (PE3)	It includes the third part of the module program.	15th week	
Oral exam (OE)	Oral exam is composed of five questions. The acquisition of theory and fact, analytical skills, critical thinking, creativity and social responsibility is tested.	Examination periods	

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Tjedni plan nastave

1. Properties and changes of air L, P - Properties of moist air used in drying; thermodynamic changes of cold air. h-x diagram calculation.
2. Physical and chemical properties of crop kernel and seeds L, P - Physical and chemical properties of crop kernel and seeds for drying and storing propose. Methodology in laboratory analysis of physical and chemical properties of seeds and kernels.
3. Technology preservation processes by drying of material - Fundamentals and methods of drying mercantile and seed material. Driers types and their division of the type of drying, dryer parts, mass and energy balances, energy consumption, environmental protection.
4. Calculation of dryers work - Calculation of dryers labor balance
5. Hydrothermal processes in the processing of agricultural products - pelleting, double pelleting, extrusion, toasting, steaming, expanding, micronizing
6. Cleaning materials P - determination of the amount and type of additives and equipment and machines for their successful removal, washing, sorting by size, shape, weight and color.
7. Warehouses (storages) and types of storage - Systems long-term and short-term storage in warehouses and silos, types of warehouses and silos, losses during storage
8. The processes during storage - physico-chemical changes during storage, with special emphasis on the process of self-heating and its prevention.
9. Adding and weighing - equipment and machinery for adding and weighing, feeder types and scales, modes of calibration.
10. Transport routes - equipment and machinery for transportation in silos and warehouses.
11. Automation process of drying and storage - Application of computer systems which form the integrated systems and implementation of integrated systems in the process of drying and storage.
12. Fundamentals of structural design - Introduction to design, manufacture working diagrams for family farms, preparation of working diagrams for industrial plants.
13. Field exercises - Field work on industrial seed processing and storage capacities.
14. Seminar - Seminar topics by agreement with each student.
15. Exam - Written and oral examination.

Obvezna literatura

1. Mujumdar; A. (2000): Drying Technology in Agriculture and Food Sciences, Plymouth, UK
2. Bala, B.K. (1997): Drying and storage of cereal grains, Science Publisher, USA.
3. Group of authors (1994): Corn, American Association of Cereal Chemists, USA.
4. Sauer, D.B. (1992): Storage of Cereal Grains and Their Productis, American Association of Cereal Chemists, USA.

Preporučena literatura

1. McN. Dagleish, J. (1990): Freeze-drying for the Food industries, Book, Elsvier, UK
2. Stout, B.A. (1989): Handbook of energy for world agriculture, Elsevier, USA

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Sličan kolegij na srodnim sveučilištima

- University of Brno
- King Mongkut’s University of Technology Thonburi (KMUTT)
- Ankara University
- University of Southern Queensland
- University of California
- University of North Carolina

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